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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/607,965	06/30/2000	Takahisa Kurahashi	1883-36	9969

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EXAMINER

KANG, DONGHEE

ART UNIT PAPER NUMBER

2811

DATE MAILED: 12/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/607,965

Applicant(s)

KURAHASHI ET AL.

Examiner

Donghee Kang

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7 and 9-28 is/are pending in the application.
- 4a) Of the above claim(s) 21 and 26 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-5, and 10-17 is/are allowed.
- 6) ☒ Claim(s) 18-20, 22-25 and 27 is/are rejected.
- 7) ☒ Claim(s) 7, 9 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Information Disclosure Statement

1. Acknowledgment is made of receipt of applicant's Information Disclosure Statement (PTO-1449) filed June 30 & October 19, 2000.

Election/Restrictions

2. Claim 1 is generic and allowable. Accordingly, the restriction requirement as to the encompassed species is hereby withdrawn and claims 4, 7, 9, and newly added claims 11-17, directed to the species of non-elected embodiment, are no longer withdrawn from consideration since all of the claims to this species depend from or otherwise include each of the limitations of an allowed generic claim. However, newly added claims 21 & 26, directed to the species of non-elected embodiment, remain withdrawn from consideration since claims 21 & 26 are dependent upon rejected claim 18.

In view of the above noted withdrawal of the restriction requirement as to the linked species, applicant(s) are advised that if any claim(s) depending from or including all the limitations of the allowable generic linking claim(s) be presented in a continuation or divisional application, such claims may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application. Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 44 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Claim Objections

3. Claims 7 & 9 are objected to because of the following informalities:

The phrase "the current diffusion layer" should be - - a current diffusion layer- - because there is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims **18-19, 20 & 22** are rejected under 35 U.S.C. 102(b) as being anticipated by Itaya et al. (US 5,459,746).

Re claim **18**, Itaya et al. teach a semiconductor light emitting element, comprising (Fig.1):

a substrate (11); a light emitting layer (15); and resonator comprising first (18) and second (13) reflecting films disposed on opposite sides of the light emitting layer, wherein the first reflecting film comprising AlGaAs and the second reflecting film comprising InGaAlP. See also Col.3, lines 33-59.

Itaya et al. do not explicitly teach the recited term "resonator". However, a pair of DBR (13 & 18) mirrors is located above and below the active region (15), thereby producing a resonant cavity light emitting diode.

Re claim **19**, Itaya et al. teach the light emitting layer comprising AlGaInP ($0 \leq y \leq 0$, $0 \leq z \leq 0$).

Re claim **20**, Itaya et al. teach a semiconductor light emitting element further comprising a current constricting layer (23; Col.4, lines 17-21) provided on the side of the light emitting layer opposite the side on which the substrate is provided.

Re claim **22**, Itaya et al. teach the current constricting layer comprising the same material (GaAs) as the substrate (GaAs).

6. Claims **18, 20, 23 & 25** are rejected under 35 U.S.C. 102(b) as being anticipated by Sugawara et al. (US 5,466,950).

Re claim **18**, Sugawara et al. teach a semiconductor light emitting element, comprising (Fig.3):

a substrate (11); a light emitting layer (15); and resonator comprising first (19) and second (13) reflecting films disposed on opposite sides of the light emitting layer, wherein the first reflecting film comprising AlGaAs and the second reflecting film comprising AlGaInP (Ga = 0). See also Col.7, line 21 – Col.8, line 67.

Sugawara et al. do not explicitly teach the recited term “resonator”. However, a pair of DBR (13 & 19) mirrors is located above and below the active region (15), thereby producing a resonant cavity light emitting diode.

Re claim **20**, Sugawara et al. teach a semiconductor light emitting element further comprising a current constricting layer (17) provided on the side of the light emitting layer opposite the side on which the substrate is provided.

Re claim **23**, Sugawara et al. teach a semiconductor light emitting element further comprising a current diffusion layer (20, p-AlGaAs) formed on the current constriction layer.

Re claim **25**, Sugawara et al. teach the substrate comprising a GaAs substrate having a surface inclined at not less than 2 degrees in the direction [011] from the plane (100). See Col.7, lines 24-27.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim **24** is rejected under 35 U.S.C. 103(a) as being unpatentable over

Sugawara et al. in view of Hosobane (JP 9-74221).

Sugawara et al. teach substantially the entire claimed invention, as applied to claim 18, except that the current diffusion layer comprises AlGaInP. Hosobane teaches in Fig.13 the current diffusion layer 137 made of (AlGa)InP can be used as the current diffusion layer instead of AlGaAs. It can reduce absorption of luminescence from a light emitting layer, hence improving efficiency of light (see paragraph 0190).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the AlGaAs current diffusion layer of Sugawara with (AlGa)InP current diffusion layer taught by Hosobane since AlGaInP current diffusion layer reduces absorption of luminescence from a light emitting layer, hence improving efficiency of light.

9. Claim **27** is rejected under 35 U.S.C. 103(a) as being unpatentable over

Sugawara et al. (US 5,466,950).

Sugawara et al. do not explicitly teach the length of the resonator is 1.5 times the resonant wavelength of the resonator. However, Sugawara et al. noted that a Bragg reflector can be selectively reflect light having a wavelength within a predetermined range of wavelengths. This range can be controlled by the refractive index and

thickness of each semiconductor layer to improve emission efficiency and it is represented by $d = \lambda / 4n$. See Col.6, lines 31-45.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select the length of the resonator using a thickness and/or index of reflecting layer as taught by Sugawara in order to improve the emission efficiency in device.

Allowable Subject Matter

10. Claims 1-5 & 10-17 are allowed.

Claims 7 & 9 would be allowable if rewritten to overcome the objection, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claim 28 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance and indicating allowable subject matter:

Prior art reference, taken along or in combination, do not teach or render obvious that a semiconductor light emitting element having a resonator composed of paired multilayer reflecting films, wherein a multilayer reflecting film on the GaAs substrate side of the light emitting layer is composed of plural layers of AlGaAs and a multilayer reflecting film on the other side of the light emitting layer is composed of plural layers of AlGaInP.

Response to Arguments

11. Applicant's arguments with respect to claims 18-20, 22-25 & 27-28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Maxiflex.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on 703-308-1690. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Donghee Kang
Examiner
Art Unit 2811

dhk